

CLAIMS

1. An inorganic polymer which comprises one or more organic functional groups and which has the following empirical formula

5 $R_m [M_2O]_x [Al_2O_3]_y [SiO_2]_z X_q \cdot PH_2O$

in which:

R represents an organic functional group;

M is an alkali metal;

X is selected from chlorine and fluorine;

10 m is > 0;

q is ≥ 0 ;

x is from 1 to 1.6;

y is from 1.0;

x/y is from 1.0 to 1.6;

15 z is from 3 to 65;

z/y is ≥ 1.0 ; and

P is from 3 to 5.

2. A polymer according to claim 1, wherein, independently, x is from 1.2 to 1.5, z is

20 from 3 to 10 and P is from 3.5 to 5.0.

3. A polymer according to claim 1, wherein q is >0.2.

4. A polymer according to claim 1, wherein the organic functional group R comprises
25 one or more types of functional group selected from the group consisting of alkyl,
alkylene, alkenyl, alkenylene, alkynyl, alkynylene, aryl, arylene, alkaryl, alkarylene,
alkenylaryl, alkenylarylene, alkynylaryl, alkynylarylene, arylalkyl, arylalkylene,
arylalkenyl, arylalkenylene, arylalkynyl and arylalkynylene, cycloalkyl, cycloalkenyl,
cycloalkynyl, and corresponding groups containing one or more hetero-atoms selected
30 from N, O and S.

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5. A polymer according to claim 1, having the empirical formula



in which R^1 is an organic functional group, n is 1, 2 or 3 and the remaining symbols are as

5 defined in claim 1.

6. A polymer according to claim 1 having the empirical formula



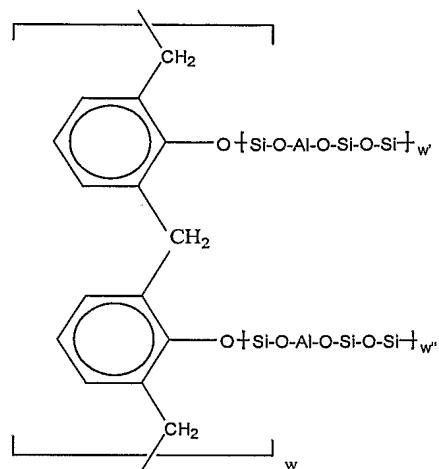
in which R^1 is an organic functional group, n is 1, 2 or 3 and the remaining symbols are as

10 defined in claim 1.

7. A polymer according to claim 1, wherein the functional group is selected from the group consisting of phenolic, amino, amido, polyamido, imido, polyimido, epoxy and (meth)acrylic functional groups.

15 8. A polymer according to claim 7, wherein the functional group is derived from one or more of the following types of resin: phenolic; polyamide; polyimide; epoxy; epoxy cresol-novolak; and (meth)acrylate.

9. A polymer according to claim 1 comprising phenolic repeat units and having the
20 following formula:



in which w, w' and w" represent the degree of polymerisation.

- 5 10. A method of preparing a polymer according to claim 1 which comprises the co-condensation reaction of an aluminosilicate, alkali polysilicate and a modifying reagent from which the one or more organic functional groups is derived.
- 10 11. A method according to claim 10, wherein the co-condensation reaction is initiated by heating at a temperature of up to 180°C.
- 15 12. A composition comprising a polymer as claimed in claim 1 in combination with one or more additives selected from the group consisting of fillers, pigments, dyes, thixotropic and rheology modifying agents, reinforcing particles, and synthetic and natural fibres and flakes, felts and fabrics.
- 13. A composition comprising a polymer claimed in claim 1 in combination with a polymeric compound.
- 20 14. A product formed from an inorganic polymer as claimed in claim 1, or from a composition as claimed in claim 11 or 12.

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15. A product according to claim 14 wherein the product is a thermally stable composite product.

5 16. A product according to claim 15 which is an adhesive, a coating or a binder for use in manufacturing and processing technology.

17. A product according to claim 15 which is an automotive, rail, marine, aviation or building component.

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18. A product according to claim 17, wherein the component is a brake component, a clutch component, an engine mould, a tyre or a lining material.

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19. A method of improving the fire resistance of timber, which comprises applying to the surface of the timber a coating comprising an inorganic polymer as claimed in claim 1.

20. A method according to claim 19, wherein prior to application of the coating the timber has a water content of 15% by weight or less.

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21. A composite material comprising as binder a inorganic polymer as claimed in claim 1 with one or more additives selected from the group consisting of a composite material containing a reinforcing material such as woven mats, non-woven mats, fibres, felts and fabrics.

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22. A fibre impregnated with an inorganic polymer as claimed in claim 1.

23. A composite material comprising a binder and an impregnated fibre as claimed in claim 22.